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ABSTRACT

One of a series of sixteen knowledge transformation papers, this paper reviews data sources for objective evaluation of vocational education, including the need for such information and the problems associated with its use. First, a list is given of thirty-five data elements necessary to evaluate a skill training problem at the secondary, postsecondary, or adult level. Then, the needs are further broken down according to these three levels as well as the elementary level. Other elements that exist outside the school environment are also recognized and are found to be related to the economic impact of vocational education. The data sources are divided into the following information topics: (1) labor market, (2) scholastics, (3) demography and population characteristics, (4) economic impact, (5) facilities and equipment, (6) personnel and/or staffing, and (7) program. Limitations on using data collected in these areas involve accuracy, comprehensiveness, timeliness, scope, form, compatibility, and coordination. Other problems are found to exist in data collection, such as insufficient data sources, methodological difficulties, and duplication. The use of a computerized data system is stressed. Besides the five primary statistical sources named in the conclusion, Appendix A lists major secondary sources for the national, statewide, and local levels. Appendix B shows the lack of a complete basic evaluation data in a national EPD program. (ELG)

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Information Series No. 158

DATA SOURCES FOR VOCATIONAL EDUCATION EVALUATION

written by

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FOREWORD

Legislative requirements for evaluation in vocational education make a systematic, data-based approach a serious concern at all levels of the evaluation process. To be systematic, evaluation must identify the expected outcomes of vocational education, the types of information needed in support of those outcomes, and the specific elements of the information required. Some of the elements involved in the evaluation of vocational education include the level of the evaluation; the target populations which are recipients of vocational education; manpower needs of business, industry, and government; population or societal needs; and economic or industrial development needs. This paper identifies many of the data elements required for systematic evaluation of vocational education, lists sources for these elements, outlines the limitations on the use of data for evaluation, and presents methodological and other problems in the use of data sources for evaluation in vocational education.

"Data Sources for Vocational Education Evaluation" is one of a series of 16 papers produced during the first year of the National Center's knowledge transformation program. The 16 papers are concentrated in the four theme areas emphasized under the National Center contract: special needs subpopulations, sex fairness, planning, and evaluation in vocational education. The review and synthesis of research in each topic area is intended to communicate knowledge and suggest applications. Papers should be of interest to all vocational educators, including administrators, researchers, federal agency personnel, and the National Center staff.

The profession is indebted to Dr. Charles O. Hopkins for his scholarship in preparing the paper. Recognition is also due Dr. John Klit, Illinois State Department of Education, and Dr. Garry Bice, the National Center for Research in Vocational Education, for their critical review of the manuscript. Dr. Carol P. Kowle, research specialist, supervised the publication of the series. Ms. Jo-Ann Cherry coordinated editing and production.

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CONTENTS

INTRODUCTION 1

PROGRAM DATA NEEDS 2

SCHOOL LEVEL DATA NEEDS 3

- Elementary 3
- Secondary 3
- Postsecondary 4
- Adult 4

ECONOMIC IMPACT DATA 5

DATA SOURCES 6

- Labor Market Information 6
  - Demand 6
  - Supply 7
  - Wage and Salary Information 8
  - Specific Skills and General Education Requirements 9
- Scholastic Information 9
- Demographic and Population Characteristics 9
- Information on Economic Activity 10
- Facilities and Equipment 10
- Personnel and/or Staffing Data 11
- Program Information 11

Social Impact 11

Vocational Education Data System 11

LIMITATIONS OF DATA 12

Accuracy 12

Comprehensiveness 12

Timeliness 12

Scope 13

Form 13

Compatibility 13

Coordination 13

INSUFFICIENT DATA SOURCES 13

METHODOLOGICAL DIFFICULTIES 14

DUPLICATION OF DATA 14

COST/BENEFIT RELATIONSHIPS TO DATA SOURCE ACCURACY 14

COMPUTER BASED DATA SOURCES 15

SUMMARY 15

APPENDIX TABLE A: Major Sources of Data 17

APPENDIX B: Preliminary Report Using Information for Planning and Evaluation National EPD Project 22

REFERENCES 25

INTRODUCTION

Many approaches can be used to evaluate vocational education. Regardless of the approach used, a number of basic questions need to be answered concerning the entire process of evaluation. These questions include:

1. Is the evaluation subjective or objective?
2. Is the evaluation at a vocational education program level?
3. Is the evaluation of vocational education at the school level?
4. Is evaluation to be at the state level?
5. Is the evaluation of vocational education going to be viewed as a national evaluation?

Addressing each of these questions requires different data and data sources.

Subjective approaches are often the only means of evaluating vocational education at any level. Many times one or more individuals are identified as "experts" in some facet of vocational education. They evaluate vocational education from that point of view and present their findings. Many times sound conclusions and recommendations result from this subjective process. The greatest problem is the fact that the evaluation is based on the evaluator's background and experiences and may not be documented.

A more systematic approach to evaluation is advocated here in opposition to a subjective report by one or more "experts." To approach evaluation in a systematic way, evaluators must first identify the expected outcomes of vocational education. This in turn requires a proper definition of vocational education. According to the vocational education amendments of 1976 (P.L. 94-482), vocational education is defined as organized educational programs which are directly related to the preparation of individuals for paid or unpaid employment or to additional preparation for a career requiring other than a baccalaureate or advanced degree. Evaluation criteria should address aspects of the process of preparing individuals for employment and any outcomes of that process.

An old cliche states that "If you don't know where you are going, any road will get you there." Effective vocational education evaluation follows many roads and specific information is required to negotiate each of these roads. Before data sources can be examined it is necessary to identify each of the elements to be evaluated. Some of the elements involved in the evaluation of vocational education include the level of the evaluation; the target populations which are recipients of vocational education (elementary, secondary, postsecondary, and adult); manpower needs of business, industry, and government service; population or societal needs; and economic or industrial development needs.

Regardless of the level or the point at which the evaluation is to be conducted, two generalizations apply. First, the better the process or system is understood, the better the chances for positive results. Second, objectives must be established before any evaluation can take place.

PROGRAM DATA NEEDS

The data needs and sources presented in this section are based on evaluation of vocational education at the program level. A vocational education program as used here refers to a specific curriculum which provides individuals with the skills to accomplish the entry level tasks necessary to perform on a specific job.

Evaluation of a skill training program at the secondary, postsecondary, or adult level requires the following data:

1. Objectives of the program
2. The length of the training program
3. Enrollment numbers in the program
4. The number of completers
5. The recommended class size
6. The competencies required
7. The competencies achieved
8. Aptitude and abilities of the students
9. The number of the completers that are available for the labor market
10. The number of the completers continuing education in the field for which they are trained
11. The number of completers working in the field for which they were trained or working in a related field
12. The number of completers working in an unrelated field
13. The number of completers not seeking any field of work
14. The number of completers unemployed and seeking employment
15. The number of completers entering military service
16. The number of completers whose status is unknown
17. The number of work stations available for training
18. The condition and size of the facility
19. The availability and adequacy of equipment
20. The age and condition of the equipment
21. The annual operating cost of the program
22. The number and kind of handicapped students
23. The individual education plan for each handicapped person enrolled
24. Types of services provided by each kind of handicapped
25. The cost of the additional handicapped services provided
26. The number and type of disadvantaged students enrolled
27. The type of service provided for the disadvantaged
28. The cost of the additional service for the disadvantaged
29. The age of the persons enrolled in the program
30. The sex of the persons enrolled in the program
31. The race of the persons enrolled in the program
32. The grade level of the persons enrolled in the program
33. The salary earned by the employed completers

34. The name and address of the employer
35. Employer satisfaction indicated for the employed completers

The above data are important to an objective evaluation of a vocational education training program.

SCHOOL LEVEL DATA NEEDS

Elementary

Fewer data elements are required for the evaluation of vocational education at the elementary level. A guidance program designed to make students aware of available career choices is the most important outcome to be evaluated. Data needs for this career awareness element should consist of identifying the number and types of careers that students have been exposed to at each grade level and miscellaneous items such as the appropriateness of materials. In addition, data could be identified on job opportunities within a local geographic area, the state, or the nation. Other information that could be utilized relates to salary, working conditions, and general education and specific skill requirements. The best sources for information on job opportunities would be the State Employment Security Agency, unions, trade associations, newspapers, and local employment offices. Salary information can be gained from Employment Security Agency offices or from follow-up of vocational education graduates. Caution should be used when examining salary information because it usually reflects entry level and average wages (see Appendix A, p. 17). Increasing elementary students' awareness of career options can affect the enrollment patterns of students at the secondary level.

Secondary

Adequate evaluation of vocational education at the secondary level requires consideration of many more data elements than evaluation at the elementary level. The following elements should be included:

1. The school's objectives
2. The total secondary level enrollment
3. The number of secondary students enrolled in vocational education
4. The percentage of secondary students being served by vocational education
5. The number of persons served by awareness and exploration programs
6. The number of vocational programs offered
7. Interest inventory data on the student population
8. Aptitude and ability data on the student population
9. The extent to which the vocational programs are consistent with student interests
10. The extent to which the vocational programs offered are adapted to the aptitude and abilities of the student population
11. Financial data such as valuation of the school district, millage levied, bonded indebtedness

12. Allowable millage and bonded indebtedness
13. Percentage of funds allocated for vocational education
14. Revenue available from all sources
15. Program budgets
16. Numbers of males and females served by vocational education
17. Numbers and types of disadvantaged students enrolled in school
18. Numbers and types of disadvantaged students served by vocational education
19. Numbers and types of handicapped students enrolled in school
20. Numbers and types of handicapped students served by vocational education
21. Number of students completing vocational programs with required competencies for employment
22. Number of vocational program completers working in the field for which they were trained or in a related field
23. Number of vocational program completers working in a nonrelated field
24. Number of vocational program completers continuing education in a related field
25. Number of vocational program completers unemployed and seeking employment
26. Number of vocational program completers not seeking employment
27. Number of vocational program completers entering the military
28. Number of vocational program completers whose status is unknown
29. Counseling services available
30. Placement services available
31. Extent to which labor market needs within the area are being met by the output of vocational education and other sources
32. Extent to which the vocational programs being offered are consistent with labor market needs
33. Degree to which architectural barriers have been removed for handicapped students
34. Accommodations for both males and females in all vocational program areas
35. Work experience and educational qualifications of vocational instructors

Postsecondary

The majority of the data elements listed in the two previous sections also relate to evaluation data needs at the postsecondary level. Exceptions would be those items unique to a secondary program or school, such as interest inventories, awareness and exploratory programs, and the valuation and millage rates. For the most part, however, financial data are essential indications of the sources of revenue available for vocational education and should be considered in evaluations of vocational education at the postsecondary level.

Adult

Data elements applicable to the secondary and postsecondary levels are also applicable to evaluation of adult vocational programs with some exceptions. A few additional items are needed for the evaluation of adult vocational education. Further data elements necessary at this level include information on the following:

1. The individual skill needed by adults to upgrade themselves in their occupations
2. The needs for upgrading of existing employed workers by business, industry, and governmental services
3. The need for preparatory skills among unemployed adults
4. The number of adults who may want to acquire new skills for new employment opportunities
5. The number of adults who may want to acquire new skills for a second income

As the focus of vocational education evaluation shifts from program and school to state and national levels, the same basic needs exist. These needs should, however, be aggregated to the level being evaluated.

ECONOMIC IMPACT DATA

Other data needs for evaluation of vocational education exist outside the school environment. These elements are related to the economic impact of vocational education expressed in such terms as cost/benefit considerations and the effect of vocational education on the economy. Elements to be examined here include:

1. The increase in capital expenditure for new industry
2. The decrease in unemployment
3. Increased numbers in the work force due to new industry and vocational training
4. The increase in tax bases: personal, sales, property, income, and real estate

Measuring the impact of quality vocational education on economic growth is not a clear cut task. Some observers would not attribute economic growth to the influence of vocational education. In several states, however, vocational education is considered a strong factor in industrial development. Oklahoma, South Carolina, Alabama, Minnesota, Illinois, and Mississippi are among the states which include vocational education in the consideration of industrial growth. In these states, vocational training and industrial development are closely linked.

The above discussion does not include all the components involved in the evaluation of vocational education. The major data needs relating to vocational education have been identified, however. Legislation, rules and regulations, guidelines, and policies mandate many of the data elements needed for evaluation. The second most important factor which dictates data needs (only legislative mandates are more important) is the consideration of the specific objectives for the vocational education program. Identification of necessary data elements is a serious preliminary activity in the evaluation of vocational education programs.

DATA SOURCES

Data sources will be grouped and discussed by the following topics: (1) labor market information; (2) scholastic information; (3) demographic and population characteristic information; (4) economic impact information; (5) facilities and equipment information; (6) personnel and/or staffing information; and (7) program information.

Labor Market Information

There are four major components of labor market information: demand, supply, wage information, and specific skills and general education requirements.

Demand

Demand information is aggregated from several sources, depending on the user. The primary source of labor market information is the Labor Market Information System of the Employment and Training Administration. The Labor Market Information System publishes current and future occupational information. The report covers occupational demand, including openings resulting from replacement expansion needs, and industry information for employment, training, and vocational education planning, career guidance, and other operational, policy, and legislative activities. The data available to most states cover 420 occupations and 201 industries and are developed for each state and Standard Metropolitan Statistical Area (SMSA) and for many non-SMSA areas (U.S. Dept. of Labor, 1976).

To improve the Occupational Information Program, another component of the Labor Market Information System is being developed, the Occupational Employment Statistics (OES) program. Under this effort, State Employment Security Agencies (SESA) are conducting surveys of employers to obtain current information on occupational employment in their establishments. The employer surveys are conducted in three-year cycles. Manufacturing industries are surveyed the first year, nonmanufacturing (excluding trade) industries the second year, and trade industries the third year. Data are being collected for approximately 2,500 occupations.

Forty-nine states are participating in the OES program; data have been collected on approximately 1,800 occupations. This is a considerable increase over the 420 occupations that have been published from the census-based I-O matrix approach used in the Occupational Information Program. Each State Employment Security Agency is required to provide vocational education with an annual report indicating the demand for and supply of workers (see Appendix A, p. 17).

The OES program does have some limitations. The demand data only cover

salary and wage employment. They do not contain demand information for agricultural, self-employed, or unpaid family workers. These sources of demand have to be gained from the census-based data. Agriculture demand data can also be derived from the Census of Agriculture or the Decennial Census data.

Other secondary sources of demand data include independent surveys, job openings from local employment offices, newspaper advertisements, and local vocational advisory committees. These sources of information may be important components to be considered in evaluation. If information found in these sources suggests that training programs are not meeting the needs for trained manpower, then vocational programs need to be expanded or redirected.

Supply

Supply information is primarily a result of training output, the number of individuals registered as unemployed individuals reentering the work force, or those in military service. Supply information is obtained from training programs as an indication of the number of persons available to enter the work force. Vocational schools in the public school sector at the secondary, post-secondary, and adult levels are major contributors to the labor market. Other sources are training programs conducted under the Comprehensive Employment and Training Administration (CETA), private schools, Job Corps, penal institutions, community action programs, vocational rehabilitation, and apprenticeship training programs.

The training facility or program represents the most effective source of reliable labor supply information. Nevertheless, obtaining accurate information from training programs is difficult. Information on program completers alone is not sufficient. The availability of the completers who intend to enter the work force must also be known. This entails devising follow-up procedures to determine the status of the potential labor supply. Under the 1976 vocational education legislation, State Occupational Information Coordinating Committees (SOICC) are charged with implementing occupational information systems. The SOICCs are composed of four agencies: the vocational education component of the State Departments of Education, the State Employment Security Agency, the State Manpower Service Council, and the vocational rehabilitation system. The problem faced by the SOICCs is that all the sources of supply are not covered by the four mandated agencies. The supply information not covered by these agencies is often difficult to acquire.

The agency or institution providing training or administering funds for training is the most likely source of labor market supply data. Some major problems are created, however, by attempts to secure supply information outside the parameters set by the 1976 vocational education legislation. Agencies not specified in legislation as sources of employment data are less likely to be cooperative in supplying information in the format required by the National Center for Education Statistics (NCES). The result is a composite of supply data from different sources with different degrees of accuracy.

Each state has sources of supply information. A primary source from the public school sector is derived from the follow-up reports submitted to the U.S. Office of Education and published in Vocational and Technical Education Selected Statistical Tables. This source is usually the State Management Information System. Project Baseline (Lee, 1974) has also been a source of information on the availability of supply from the public sector. The State Employment Agency is required to supply information to vocational education but can provide information only on job applicants and employment security registrants. Comprehensive Employment and Training Act (CETA) agencies are also required to report their supply. The State Manpower Service Council or the Department of Labor can provide data relative to this supply sector. Many states have laws requiring private training sources to report their graduates to a designated governing board or agency. Licensing agencies also provide a source of labor supply information. Labor supply information, therefore, must be based on several sources to provide an accurate picture of the labor market.

Two major sources of supply information are specified under the 1976 vocational education legislation. These are the National Center for Education Statistics (NCES) reports and the State Occupational Information Coordinating Committee Occupational Information System. The primary source in State Departments of Education is the management information system existing in each state. These vary from extremely sophisticated systems to manual systems (Starr, 1977).

Wage and Salary Information

The State Employment Security Agencies gather information on entry level wages and average wages by occupation for statewide totals and SMSAs. There are limitations to the wage data published by the State Employment Security Agencies.

The vocational completer who is employed is another source of information. States include wage information as a part of student follow-up. This information is incorporated into state information systems. Other sources of salary information are also available in the form of state and federal income tax returns. Restrictions for the sake of privacy would not be violated in the use of income tax data because social security numbers from groups or classes of vocational students could be forwarded to tax offices and matched with social security numbers on the tax form. The average income for the entire class could be determined immediately. Tax forms also list the occupation of the person reporting; however, the individual may have more than one source of income, and occupational information could be misleading. The tax return in many instances may be a joint return. All things considered, there still exists the possibility of gaining salary information from tax returns if Congress deemed it necessary. The Division of Vocational Education, Department of Education, State of Ohio, has conducted a feasibility study on the subject (Ghazalah, 1978).

Specific Skills and General Education Requirements

This information is contained in a supplement to the Dictionary of Occupations Titles, 3rd Edition. Characteristic data such as interest, aptitude, physical demands, and working conditions are key factors to consider when evaluating occupational data against the capabilities and limitations of individuals or groups.

Occupational preparation data describe the educational development and length of training normally required for an occupation. This category also includes information on whether an occupation is entry level or requires experience in related or lower level occupations.

Scholastic Information

Scholastic data relate to factors essential to a description of the student population. Essential information on the student population is gathered by the institution and aggregated for state and national perspectives. Data should be gathered on total enrollment and numbers enrolled in vocational education. In order for evaluation to take place at different levels, data should be available on the following:

1. Enrollment by program
2. Interest inventories
3. Aptitude and ability of students
4. Sex, age, and race of population in school
5. Those enrolled in vocational programs
6. Numbers of disadvantaged and handicapped individuals served by vocational education by type and number

The initial source of information exists at the local level. As the information is communicated to a higher level of aggregation, different viewpoints are essential for evaluation. Enrollment information exists in State Departments of Education, the U.S. Office of Education, and the National Center for Education Statistics. No single source can provide the necessary data elements. In his study of management information systems, Starr (1977) found that data were assembled in varying degrees of detail and sophistication.

Demographic and Population Characteristics

The main elements of demographic data are:

1. Numbers of persons residing within an education service area
2. The age distribution of the population
3. The ethnic composition of the population
4. The number of families and/or individuals below poverty income
5. The single heads of household

6. The number of children living with single heads of household
7. The general educational level of the population

The primary use of these data in vocational education evaluation is to examine the target groups to see if they are being served. The information is also beneficial in relating the level of funding to needs as reflected in the demographic data. If funds need to be targeted to certain populations then vocational services can be evaluated to see if the need is being met.

The U.S. Census is the main source of demographic data. The Bureau of the Census can supply any data gathered from the enumerations. Another source of population data is State Employment Security Agencies. In some states independent research firms and universities gather, assemble, and publish demographic and human resource data. Each state has a department of social services that gathers and disseminates large masses of data. The most frequently used data for vocational education are in the areas of aid to dependent children and welfare recipients by age and classification (see Appendix A, p. 17).

Information on Economic Activity

Almost every state has an economic development department, which is a primary source of economic data. Most states also have an industrial development department within the state government. These departments provide information on capital investments by new or expanding industries. The State Tax Commissions can provide information on revenue generated by specific components of the state tax base.

The U.S. Department of Commerce, Bureau of Economic Analysis, provides masses of data on economic activities in its publication, Area Economic Projections, 1990 (n.d.). These data are useful in evaluating the macro-effect of vocational education on the economy within a region, a state, or the nation (see Appendix A, p. 17).

Facilities and Equipment

Information on facilities and equipment is necessary in the evaluation of the quality of a vocational program. The local training institution at the program level is the best source of this information. Several studies have been made. The best known among these is the National Study of Vocational Education Facilities and Resource Utilization (1978). It is difficult to conduct micro-evaluation from these data, however. In the future, the National Center for Education Statistics will become the primary source of facility data. At present, some states, such as Oklahoma, have a computerized inventory of equipment indicating item, purchase price, age, and condition. Some states also gather information about equipment as a part of their evaluation process.

Personnel and/or Staffing Data

State information systems gather and assemble data related to personnel and staff. The information is passed from each state to the National Center for Education Statistics. By FY 1979 data should be available nationally regarding vocational staff and personnel. Information can be gained from the agency responsible for certifying teachers for vocational education programs within each state. Caution must be used with these data because of the privacy requirements.

Program Information

A point to be reemphasized relates to program objectives. The main thrust of vocational education is to prepare persons for employment in a given occupation. The key ingredient in evaluation is the ability to gain enough data to know how well vocational education is preparing persons for employment. The competencies required need to be identified and available for evaluation. The most complete sources of existing information on occupational competencies are the Vocational Technical Education Consortium of States (V-TECS) materials.

Social Impact

An element that often surfaces in the evaluation of vocational education relates to the effect that student organizations have on the quality of leadership and citizenship of program completers. Student organizations are an integral part of vocational training programs. Information on the activities and accomplishments of these student organizations can be gained from programs of work and activity reports. It is difficult to measure precisely the effect these activities have on individuals.

Vocational Education Data System

Some states obtain evaluation data as a part of the local application each school submits annually. Other information is part of the requirement of the Vocational Education Data System (VEDS) which each local educational institution submits to the state agency. The (VEDS) data requirement consists primarily of the following components:

1. Program Enrollment and Termination Report
2. Staff Report
3. Finance Report
4. Student and Employer Follow-up Report
5. Facilities and Equipment Report

Each source of information has a set of standard definitions by which the data are to be gathered and submitted. One of the major concerns at present

is that the system is not ready for use. Data requirements and definitions at the local level, as designated in P.L. 94-482, were not feasible in the detail specified by the legislation.

LIMITATIONS OF DATA

Regardless of data source, there are limitations to the use of data for evaluative purposes. These limitations include:

1. Accuracy
2. Comprehensiveness
3. Timeliness
4. Scope
5. Form
6. Compatibility
7. Coordination

Accuracy

The importance of accuracy is unquestionable in statistical reporting. Yet, it is not always possible or feasible to gather precise data. The level of quality or accuracy must be determined in each situation. The degree should be based on the evaluation to take place. Finite data should not be gathered in great detail if trend data is all that is needed. Usually, a higher degree of accuracy results in greater cost. Available funds may therefore limit the degree of accuracy of data.

Comprehensiveness

Data should be gathered in the detail necessary for evaluation. Different levels of evaluation require different levels of comprehensiveness. Decisions must be made in this regard because insufficient data may cause the entire system to lose credibility. The value of comprehensiveness relates to the cost of securing the information.

Timeliness

Information must be available to the evaluation process in sufficient time for analysis to take place. If information is not available when needed, then the source becomes insignificant. The data should be current. When data are perceived as stale, then usefulness diminishes. This can be one of the limiting factors in the use of census data.

Scope

The scope of the data to be used must be established in evaluation of vocational education. Data must be assembled in consideration of the level of evaluation. National and state data may not be useful if a local school or program is being evaluated. Conversely, if the impact of vocational education at the state and national level is being evaluated, facts about local schools or programs serve little purpose.

Form

The manner in which data are presented is important. If data are difficult to interpret, they are not useful. Users of information are heterogeneous and greater impact will be achieved if data are clear, concise, and understandable.

Compatibility

Because vocational education is evaluated at different levels, the data should be compatible. Today this is one of the greatest difficulties existing in vocational education data. Despite a mandate from Congress to establish common definitions of and standards for data, states have differing views as to what these should be. There is still no assurance that data from different states will be compatible.

Coordination

Data are often gathered from different sources within the same organization. This can cause duplication of data. Many times the data are gathered differently by different sources within the organization. Danger lies in the fact that conflicting data may be released. It is extremely important for an organization to coordinate the collection and reporting of data. This reduces duplication, eliminates conflicting data, and results in greater credibility.

INSUFFICIENT DATA SOURCES

Adequate evaluation necessitates data elements related to costs, follow-up, facilities, equipment, and economic impact data, although the literature on data sources indicates that there is a dearth of this kind of information. A study of twenty-five states conducted by the Oklahoma State Department of Vocational and Technical Education has shown that basic evaluation data elements are lacking in many states (see Appendix B, p. 22). Despite the fact that State Employment Security Agencies are mandated to provide vocational education agencies with demand and supply data, many states receive demand data in a format which cannot be used for evaluation. Most states lack general scholastic information on target populations such as disadvantaged persons, handicapped

persons, persons with limited English speaking ability, and dropouts. Evaluation is difficult without these basic data elements.

METHODOLOGICAL DIFFICULTIES

Questionable accuracy and credibility is a major methodological difficulty in the use of existing data for evaluation. This problem becomes more serious as data are aggregated to state and national levels.

In particular, evaluators are often faced with the problem of determining the reliability of demand and supply data. This is further complicated by the way the data are presented by the Employment Security Agencies and training sources. Geographic disaggregation of demand and supply data from the current sources is almost impossible.

Expenditure data for vocational education training at institutional levels are nearly always reported categorically in terms of administrative costs, salaries, benefits, operation and maintenance of plant, and not by program. Little is known about adequacy of facilities and equipment. In summary, use of data for meaningful evaluation is very difficult in terms of existing data elements.

DUPLICATION OF DATA

Experience indicates that duplication of data does occur, although the literature does not contain much commentary on this problem. Duplication exists even in states with management information systems. Most occupational areas and departments needing enrollment data have separate methods of gathering information. In fact, the greatest amount of duplication occurs in the area of enrollment data. Personnel and staff information is also frequently gathered by different departments within the same organization. Teacher certification agencies outside of vocational education may gather duplicate information on teachers.

Firms and agencies operating outside state departments of education represent a major source of data duplication.

COST/BENEFIT RELATIONSHIP TO DATA SOURCE ACCURACY

Several factors influence cost/benefit relationships involved in the use of data sources. The most important factor concerns the impact of decisions to be made as a result of the evaluation. Accuracy of data also becomes a concern when the decisions to be made affect funding. On the other hand, trend data may be acceptable if the decisions resulting from evaluation involve only recommendations concerning the need for vocational education.

Comprehensiveness, timing, and the volume of information to be gathered and used affect the cost of securing data. Cost/benefit analysis also involves consideration of whether a system can be manual or automated.

An example of the importance of these considerations relates to demand and supply data. Vocational administrators at the state level may be faced with the choice between the census-based I-O matrix with 460 occupations or the Occupation Employment Statistic with 1800 occupations. Census-based demand data are considerably less expensive. If this meets the needs within a state, then additional funds need not be spent for the OES data. However, if detailed demand data are desired for evaluation purposes, then state administrators must weigh the additional cost against the expected benefits.

Another problem faced by states relates to follow-up of the entire population of vocational program completers. It is less expensive to gather information on a sample portion of the population, but the conclusions drawn may be less valid. The possibility of reduced accuracy of conclusions must be weighed against increased costs. The level of aggregation also affects the cost/benefit relationship. If data are to be used for macro evaluation, some detail may be sacrificed for the sake of savings. In conclusion, many factors need to be considered when determining cost/benefit relationships. These examples represent only a few of the factors involved.

COMPUTER BASED DATA SOURCES

Although documentation is difficult, many states have computer based information systems in vocational education. All State Employment Security Agency offices have access to computer systems and all census-based data are on computer systems.

A computerized data system is almost essential for the use of the type of data discussed here. Private computer firms have developed software packages to handle state data needs. Some states have developed their own computerized systems. Additionally, the National Center for Research in Vocational Education at The Ohio State University has the capability to handle state data needs with a computerized information system (MISVE). In the near future, every state should be able to afford a computer processing system.

SUMMARY

The data and data sources identified here are the most common types and sources used in evaluation of vocational education. The primary sources of evaluation data are:

1. Bureau of Labor Statistics
2. Bureau of the Census

3. State Employment Security Agencies
4. National Center for Education Statistics
5. State Departments of Education Management Information Systems

Secondary sources are presented in Appendix A, p. 17.

There are a number of available sources, but many are not useful for vocational education evaluation. The level at which evaluation is to be conducted is a major factor in determining a sufficient data source. The impact the evaluation has on decision making affects the sufficiency of data sources. The greater the impact the greater the need for accurate and detailed data.

APPENDIX TABLE A – MAJOR SOURCES OF DATA

Data Element	Source	Frequency	Geographic Scope	Published or Available from
1. *Occupational estimates and projections*–occupations within industry and cross-industry. Contains intermediate and long-run projections and job openings data.	Cooperative Federal-State Occupational Employment Statistics–Survey Program	3-year cycle	Statewide and for some states selected substate areas	Cooperating State Employment Security Agencies
	Cooperative Federal-State Occupational Employment Statistics–National, State, Area Projections Program	Annually	Statewide and selected substate areas	Cooperating State Employment Security Agencies
2. *Estimates and projections of supply*–Institutional and noninstitutional.	Annual Report on Vocational and Technical Education	Annually (FY)	Statewide and substate areas	State Departments of Education and Vocational Education
	Vocational and Technical Data	Annually (FY)	Statewide and substate areas	State Departments of Education and Vocational Education
	CETA Management Information Systems (MIS)	Annually (FY)	Statewide and substate areas	CETA Prime Sponsors
	Employment Security Automated Reporting System (ESARS)	Quarterly, Annually, (FY)	Statewide and substate areas	State Employment Security Agencies
	Projections of Educational Statistics	Annually	National	Office of Education
3. *Applicants and job orders on file with the SESA's*	Employment Security Automated Reporting System (ESARS)	Quarterly and FY	Statewide and substate areas down to the ES local office level	All State Employment Security Agencies
4. *Wage rates for selected occupations*	Employment Security Automated Reporting System (ESARS)	Quarterly and FY	Statewide and substate areas down to the ES local office level	All State Employment Security Agencies
	Area Wage Surveys. Available in various numbered bulletins	Annually	SMSA's, Regions, National	Bureau of Labor Statistics
	Service Contract Act Surveys. Available in various numbered bulletins	Annually	Selected Areas	Bureau of Labor Statistics
	Municipal Government Wage Surveys. Available in various numbered bulletins	Annually	Selected Areas	Bureau of Labor Statistics
	Industry Wage Surveys. Available in various numbered bulletins	Annually	Selected Areas	Bureau of Labor Statistics

Appendix Table A – Major Sources of Data (Continued)

Data Element	Source	Frequency	Geographic Scope	Published or Available from
4. (Continued)	Union Wages and Hours Surveys. Available in various numbered bulletins	Annually	Selected Areas	Bureau of Labor Statistics
	Occupational Outlook Handbook (OOH)	Biannually	National	Bureau of Labor Statistics
	Professional, Trade, and Industry Associations, Unions	Varies with source	Varies with source	Varies with source
	State and Federal Income Tax Forms	Annually	Selected Areas	Internal Revenue and State Tax Commission
5. *Occupational definitions*	*Dictionary of Occupational Titles (DOT), 3rd Edition 1965*	Periodic	National	Employment and Training Administration
	OES Survey Dictionary	Periodic	National	Bureau of Labor Statistics and Cooperating SESA's
	Occupational Outlook Handbook (OOH)	Biannually	National	Bureau of Labor Statistics
	Job Descriptions of Large Employers, U.S. Civil Service Commission, State Government Personnel Offices, Local Government Employers	Varies with source	Varies with source	Varies with source
	Professional, Trade, or Industry Associations	Varies with source	Varies with source	Varies with source
	Employment Security Automated Reporting System (ESARS)	Quarterly and FY	Statewide and sub-state area down to the local office area	All State Employment Security Agencies
6. *Occupational Characteristics*– interests, aptitudes, physical demands, working conditions.	*A Supplement to the Dictionary of Occupational Titles, 3rd Edition*	Periodic	National	Employment and Training Administration
	Occupational Outlook Handbook (OOH)	Biannually	National	Bureau of Labor Statistics
	Occupational Outlook Quarterly	Quarterly	National	Bureau of Labor Statistics
	Large Employers, Unions, Professional, Trade, or Industry Associations	Varies by source	Varies by source	Varies by source
	Surveys of Scientific and Technical Personnel	Varies by source	National	National Science Foundation

Appendix Table A – Major Sources of Data (Continued)

Data Element	Source	Frequency	Geographic Scope	Published or Available from
7. *Occupational preparation.*	*Occupational Outlook Handbook (OOH)*	Biannually	National	Bureau of Labor Statistics
	Occupational Outlook Quarterly	Quarterly	National	Bureau of Labor Statistics
	Directory of Professional and Occupational Licensing in the U.S.	Undetermined	National and Statewide	Juvenal L. Angel, Modern Vocational Trade Bureau
	Occupational Licensing and the Supply of Non-professional Manpower	Undetermined	National	Employment and Training Administration
	ERIC Instructional Package for Vocational Educators	Annually	National and Statewide	Educational Resource Information Center
	A Supplement to the Dictionary of Occupational Titles, 3rd Edition	Periodic	National	Employment and Training Administration
	Projections of Education Statistics	Annually	National	Office of Education
	Annual Report on Vocational and Technical Education	Annually	Statewide and sub-state areas	State Departments of Education
8. *OE Curriculum codes.*	*Vocational Education and Characteristics of Students and Teachers*	Unknown	National	Office of Education
	Vocational Education and Occupations	Periodic	National	Office of Education, Bureau of Labor Statistics
	Tomorrow's Manpower Needs, Bulletin 1606; Supplement 3, 1973: Matching Occupational Classifications to Vocational Education Program Codes	Periodic	National	Bureau of Labor Statistics
	OES–OE Conversion Listing	Periodic	National	Bureau of Labor Statistics, Cooperating SESA's
9. *Vocational Student Information: Enrollments Followup, Characteristics*–age, race, sex, grade, etc.	USOE Enrollment Report	Annually	National-State	U.S. Office of Education
	Vocational Education Data Systems (VEDS)	Annually	National-State	National Center for Education Statistics
	State Occupational Information Systems (SOICC)	Annually	State	State SOICC

Appendix Table A – Major Sources of Data (Continued)

Data Element	Source	Frequency	Geographic Scope	Published or Available from
9. (Continued)	State Management Information Systems	Periodic	State and Local	State Departments of Education and Vocational Education
	Local School Records and Reports	Periodic	Local	Local Schools
	Private Training School Records and Reports	Periodic	Local	Private Schools
	Private School Accrediting Agency	Annually	Local and State	State Private School Accrediting Board or Agency
	Licensing Agency	Periodic	State and Local	State Licensing Board or Agency
	Project Baseline	Periodic	National and State	Northern Arizona University
10. *Facilities and Equipment Utilization, Space, Condition, Adequacy & Investment*	National Study of Vocational Education Facilities and Resource Utilization	Unknown	National	Westat Inc., Rockville, MD
	Vocational Education Data System (VEDS)	Pending	National and State	National Center for Education Statistics
	State Information System	Periodic	State and Local	State Department of Education and Vocational Education
	Local School Records and Reports	Periodic	Local	Local Schools
11. *Curriculum*—Task and competencies, emphasis areas	V-TECS Catalogs	Periodic	Unknown	V-TECS—Atlanta, Georgia
	Occupational Employment Statistics Survey	3-year cycle	Statewide and substate areas	Participating State Employment Security Commissions
	Curriculum Laboratories Network	Periodic	National	U.S. Office of Education
12. *Economic Impact Data*—Investments, taxes	Area Economic Projections, 1990	Unknown	National, State, and Cities	U.S. Department of Commerce, Bureau of Economic Analysis
	State Industrial Development Reports	Periodic	State and substate	State Industrial Development Departments

Appendix Table A – Major Sources of Data (Continued)

Data Element	Source	Frequency	Geographic Scope	Published or Available from
12. (Continued)	Tax Commissions Reports	Periodic	State, sub-state, and local	State Tax Commission
	Economic Development Office Reports and Records	Periodic	State, sub-state, and local	State and Regional Economic Development Office
13. *Computer Systems*	Management Information System for Occupational Education (MISOE)	Unknown	Undetermined	Massachusetts State Department of Education Boston, Division of Vocational Education
	Management Information System for Vocational Education (MISVE)	Unknown	Undetermined	The National Center for Vocational Education, Ohio State University
	Management Information Systems for Vocational Education – A National Study	Unknown	National	The National Center for Research in Education, The Ohio State University
14. *Financial Information*	Vocational Education Data System (VEDS)	Pending	National and State	The National Center for Education Statistics
	State Information Systems	Periodic	State and Local	State Departments of Education and Vocational Education
	Local School Reports and Records	Periodic	Local	Local Schools and Institutions
15. *Personnel and Staff Reports*	Vocational Education Data System (VEDS)	Pending	National and State	National Center for Education Statistics
	State Credentialing or Certification Reports	Annually or Periodically	Statewide	State Certification Agency or Department
	State Information Systems	Periodic	Statewide and local	State Department of Education or Vocational Education
16. *Demographic Data,* Number of persons, age, sex, race, income levels, occupations, and general or social characteristics	Census Publications	Decennial and Some Annual Update	National, State, sub-state, County, District, and Place	Bureau of the Census, U.S. Department of Commerce

APPENDIX B – PRELIMINARY REPORT–USING INFORMATION FOR PLANNING AND EVALUATION
NATIONAL EPD PROJECT*

DATA ELEMENT	AVAILABILITY				SOURCE OF DATA						AVAILABLE LEVELS OF AGGREGATION											PERCEIVED ADEQUACY (RELIABILITY & VALIDITY)					INCLUSION IN PLNG. AND EVAL. PROCESS			
	Readily Available	Derivable from Other Available Data	Known to Be Unavailable	Unknown	LEA	SEA	Other State Agency	Federal Agency	Private Organization	Personal Knowledge	Students	Class	Prog. (6 digit USOE)	Div. (2 digit USOE)	School District	County	SMSA	Labor Market	Planning District	State	Region	Inadequate	Acceptable but Less than Adequate	Adequate	Approaching Optimal	Optimal	Unimportant–Not Included	Included to Meet Fed. Requirements Only	Necessary for Viable Plan–Included	Considering Inclusion in Future
Current Employment by Occupation	6	1				1	6				1		3	2		1	4	3	4	7	1	3	1	1	2			3	5	
Current Employment by Industry	4	3					7						1	1		2	5	3	3	7	1	2	1	2	2			2	2	1
Current Unemployment by Occupation	2	4	1				7							1			4	3	3	6	1	3	1	1	1		1	1	2	1
Current Unemployment by Industry	1	4	2				6							1			4	3	3	5	1	2	2	1	1		2		1	1
Hours & Earnings by Occupation	1	2	3	1			4							1			1	2	1	3	1	1	2	1			3	1		
Hours & Earnings by Industry	3	1	1	2			6							1		1	2	3	1	5	1	3	2	1			4	1		
Labor Force Trends	4	1	1	1			6	1					2	2			2	2	2	5	1	3		2	1		2	1	2	
Seasonal Adjustment	3	1		3			4							1			3	1	1	3	1			3	1		1		2	
Demand by Occupation	4	3			1	2	6						2	2			4	3	3	7	1	3		1	3			2	5	
Demand by OE Code	3	3	1		1	4	4						2	2			4	2	3	6	1	1	1	2	2			2	4	
Turnover Rates by Occupation	3	3				1	4	1					1	1			2	1	1	5		3	1	2			1	1	2	
Projections of Expansion Needs by Occupat'n	5	2			1	3	6						2	2	1	1	3	1	2	6		2		2	2			3	4	
Projections of Expansion Needs by Industry	1	4		1	1	2	4							1			2	1	1	4		1	2	2				3	2	
Projections of Replacement Needs by Occupation	4	3			1	2	6						2	2	1	1	3	1	2	6		2	1	3	1			3	4	
Projections of Replacement Needs by Industry	2	3		1	1	2	4							1	1	1	2	1	1	5		1	2	2				3	2	
Current No. Job Applicants by Occupation	4	1	1	1			6						1	3		1	3	2		5		1		5			3			1
Characteristics of the Unemployed	1	3	1	2	1		5			1				1		1	2	1		4		1	1	2			2	1		
Insured Unemployed by Occupation	2	3		2			5						1	2		1	2	1		4		1		4			1		1	2

*Based on returns from seven participating states.

DEMOGRAPHIC

DATA ELEMENT	AVAILABILITY				SOURCE OF DATA						AVAILABLE LEVELS OF AGGREGATION											PERCEIVED ADEQUACY (RELIABILITY & VALIDITY)					INCLUSION IN PLNG. AND EVAL. PROCESS			
	Readily Available	Derivable from Other Available Data	Known to Be Unavailable	Unknown	LEA	SEA	Other State Agency	Federal Agency	Private Organization	Personal Knowledge	Students	Class	Prog. (6 digit U3OE)	Div. (2 digit USOE)	School District	County	SMSA	Labor Market	Planning District	State	Region	Inadequate	Acceptable but Less than Adequate	Adequate	Approaching Optimal	Optimal	Unimportant–Not Included	Included to Meet Fed. Requirements Only	Necessary for Viable Plan–Included	Considering Inclusion in Future
Duration of Unemployment		3	1	3			3							1			1	2		4		1	2	1			3	1		
Worker Commuting Patterns	1		2	4			3	1								1				1		3		1			2			
CETA Supply by Occupation	4	3				3	2	1			2	1	3	2	1	2	1	3	3	5		2	3	2				2	2	1
Private School Supply by Occupation	3		3		1	2	2		1		2		3	3			1		1	3	2	2	2		1			2	2	
Public School Supply by Occupation	7				3	7	1				4	3	6	4	2	1	2	2	3	4	2		3	1	2	1			7	
Armed Forces Supply by Occupation		1	1	5				3		1												1					1		1	1
Unemployed Veterans	1	2	1	3			1	2											1	3			1	2			2	1		
Population Trends	3	4				1	6	2							1	4	3	1	2	6	2		2	4	1			1	5	1
Population Patterns	2	5				1	6	1							1	4	3	1	2	6	2		2	4	1		1	1	4	1
Migration Patterns	1	3	2	1			5	1							1	3	3	1	2	5	2	2	1	2	1		2	1	1	1
Components of Population Changes		4	2	1		1	6	1							1	3	2		1	4	1	2	1	2	1		2	1	1	1
Minority Population Projections	1	4	1	1		1	4								1	3	2		1	4	1	1	1	3	1			3	2	1
Physically Handicapped	1	4	1	1	2	4	3				1	1	1	1	3	2	2	1	1	4	2	1		2	2			3	2	1
Mentally Handicapped	1	4	1	1	2	4	4				1	1	1	1	4	2	2	1	1	5	2	1	1	2	2	1		3	3	1
Economically Disadvantaged	2	3	2		1	4	2		1		1	1	1	1	2	4	3	2	1	4	3		2	2	1	1		3	3	1
Budget Needs	3	4			5	5						1	2	2	3	1	1		1	4	1		1	4	1				6	
Projected Budget Needs	3	4			5	5						1	2	2	3	1	1		1	4	1		1	4	1				6	
Projected Available Budget Needs	2	4			3	5						1	2	2	3		1		1	3	1			4	1				5	
Tax Base Trends	1	2	1	3		3	3								3	1	1			5	2		1	3	1		3	1	1	

APPENDIX B – PRELIMINARY REPORT–USING INFORMATION FOR PLANNING AND EVALUATION (Continued)

	DATA ELEMENT	AVAILABILITY				SOURCE OF DATA						AVAILABLE LEVELS OF AGGREGATION											PERCEIVED ADEQUACY (RELIABILITY & VALIDITY)					INCLUSION IN PLNG. AND EVAL. PROCESS			
		Readily Available	Derivable from Other Available Data	Known to Be Unavailable	Unknown	LEA	SEA	Other State Agency	Federal Agency	Private Organization	Personal Knowledge	Students	Class	Prog. (6 digit USOE)	Div. (2 digit USOE)	School District	County	SMSA	Labor Market	Planning District	State	Region	Inadequate	Acceptable but Less than Adequate	Adequate	Approaching Optimal	Optimal	Unimportant–Not Included	Included to Meet Fed. Requirements Only	Necessary for Viable Plan–Included	Considering Inclusion in Future
FINANCIAL	Projected Tax Base		3	1	3		2	4								4	1	1			5	1		2	2	1		2	1	1	
	Cost to Equip Specific Programs	3	1	2	1	3	4	2					2	3	2	3	1	1			4	1	1	2	1	2	1	1	1	3	1
	Cost to Build Facilities	4	2	1		4	5	2					1	3	2	3	1	1			4	1	1		3	2	1	1	1	4	1
	Cost per Enrollment by Program	2	4	1		4	5	1					1	4	3	3	1				4	1	2	1	1	2		4	1	1	1
	Cost per Completion by Program	1	5	1		4	5	1					1	4	3	3	1				4	1	2	2	1	1		4	1	1	1
	Cost per Employed Related by Program	1	4	2		3	3	1					1	2	2	3	1			3			3	1	1			4			1
ECONOMIC INDICATORS	Residential Construction Permits	1	2	1	3	1		2		1							1		1	1	3	1			3			4			
	New Business Incorporations	2	3	1	1		1	5									1		1	1	4	2			3		1	2	1	1	
	Personal Income	2	2	1	2		1	4	1	1							1			1	4	2			4			3	1	1	
	No. Families Receiving AFDC	1	2	1	3		1	4	1									1	1	1	4	1			4			2	1	1	
	No. Families Receiving Other Welfare Payment		3	1	3		1	4	1									1	1	1	4	1		2	2			2	1		
SCHOLASTIC	Population to be Served (No. & Levels)	5	2			2	4	3	1			2	1	2		2	4	1	1	3	6	2		1	4	2			1	5	1
	Characteristics of Pop. to be Served	4	2	1		3	2	2	2			2	1	2		2	4	1	1	3	5	2	1		5	1			1	4	1
	Special Populations	3	4			3	4	3	2			2	1	2		2	4			2	6	2		1	5	1			1	4	1
	Interest Patterns		1	2	4	3					1	1	1	1		2	1					1	1	1	2			1	1	1	1
	Aptitude Patterns		1	2	4	2					1		1	1		1	1					1	2	1	1			2	1		1
	Number Enrolled	7				5	6					4	2	6	3	4	2	1	1	2	4	2		2	3	1	1		1	7	
	Number Completers	5	2			5	6					4	2	6	3	4	2	1	1	2	5	2	1	2	1	2	1		1	7	
	Number Employed Related	4	3			5	6					4	2	5	2	4	2	1	1	2	5	2	2	1	2	1	1		1	6	1
	Number Continuing Education	4	2		1	5	5				1	4	2	5	2	4	2	1	1	2	5	2	2	1	1	2	1		2	6	1
	Projected No. of Teachers Available	2	4		1	2	5	2			1			2	1	2	1			1	5	1	2	2	1	2			3	2	1
	Facility Utilization	2	4		1	3	3	1				1	1	1	1	3	1				2	1	2	1	2			2	1		1

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